FETAL DEVELOPMENT OF THE LONG BONES OF LOWLAND PACA (*CUNICULUS PACA*) BY ULTRASONOGRAPHY

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Introduction

The paca (*Cuniculus paca*) is a frugivorous hystricomorphic rodent in the tropical forests of South and Central America. This species is appreciated for its meat, which makes it an important resource of subsistence for Amazon people, and has important ecological roles, as seed disperser and prey specie.

Objectives

Describe the long bones development during the gestational period, in order understand its precocial nature, and establish relationships with its life history.

Material & Methods

- 101 paca embryos/fetuses collected from two locations in the Amazon forest (2002 - 2016).
- External biometrics measurement: total dorsal length (TDL).
- Ultrasonography analysis: measurement of each mineralized (hyperechoic) and non-mineralized (anechoic) structure in the thoracic limb (humerus and radius) and pelvic limb (femur and tibia).

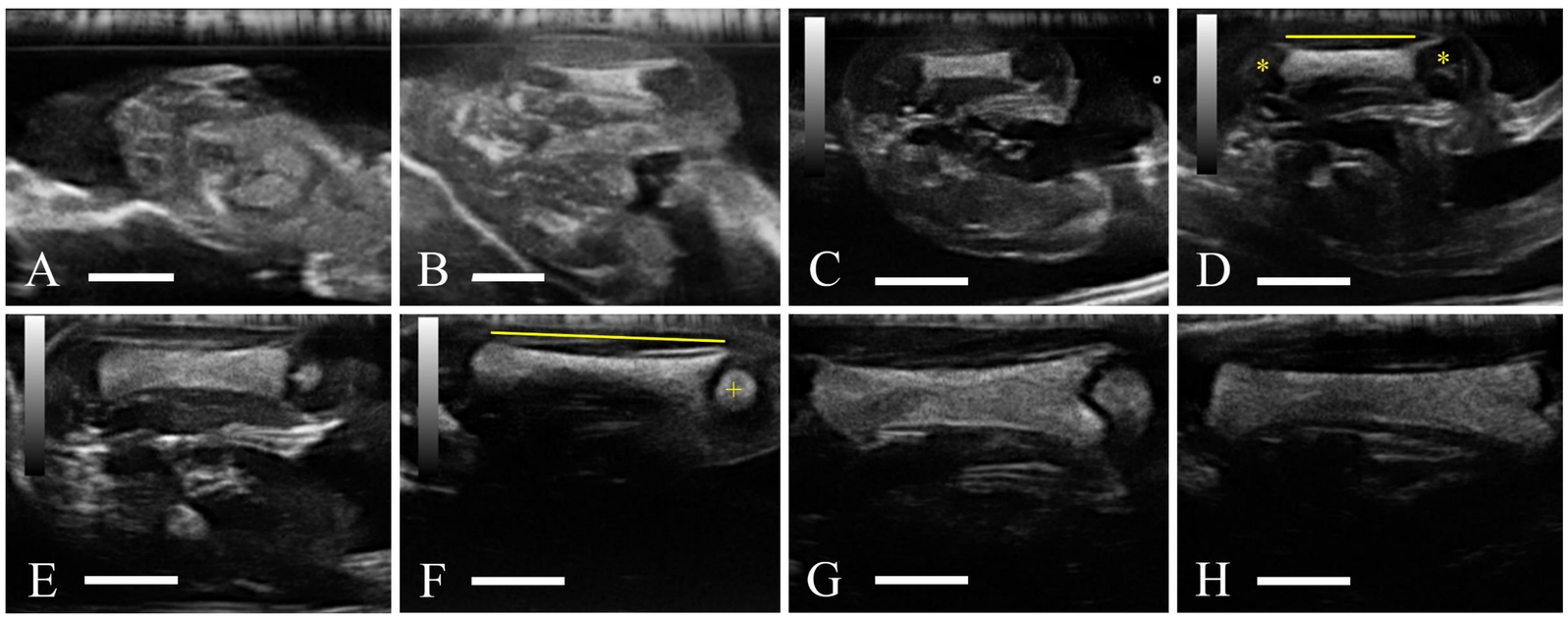

Figure 1. Ultrasound images showing the evolution of the femur in different fetal stages in lowland paca fetuses (*Cuniculus paca*). Longitudinal cut. **A.** Fetus with a TDL of 6,9 cm (bar: 5 mm). **B.** Fetus with a TDL of 10,4 cm (bar: 5 mm). **C.** Fetus with a TDL of 14 cm (bar: 9 mm). **D.** Fetus with a TDL of 16,5 cm (bar: 10 mm) **E.** Fetus with a TDL of 20,4 cm (bar: 10 mm). **F.** Fetus with a TDL of 22,2 cm (bar: 10 mm). **G.** Fetus with a TDL of 27,1 cm (bar: 10 mm). **H.** Fetus with a TDL of 35,9 cm (bar: 13 mm). Mineralized diaphysis (solid line); epiphysis (*); Distal epiphyseal nucleus (+).

Discussion

The onset of the diaphysis mineralization occurs earlier in hystricomorphs (34% of the gestational period) than in the lab rat (75% of the gestational period).

Compared with other altricial species (cat and dog), the newborn paca has all secondary ossification centers mineralized, showing earlier motor ability.

Intrauterine bony development seems to be related to the habits this rodent will have during its postnatal life.

- **Digging** → radius and distal humerus more robust.
- **Swimming** → tibia larger and more robust than femur.

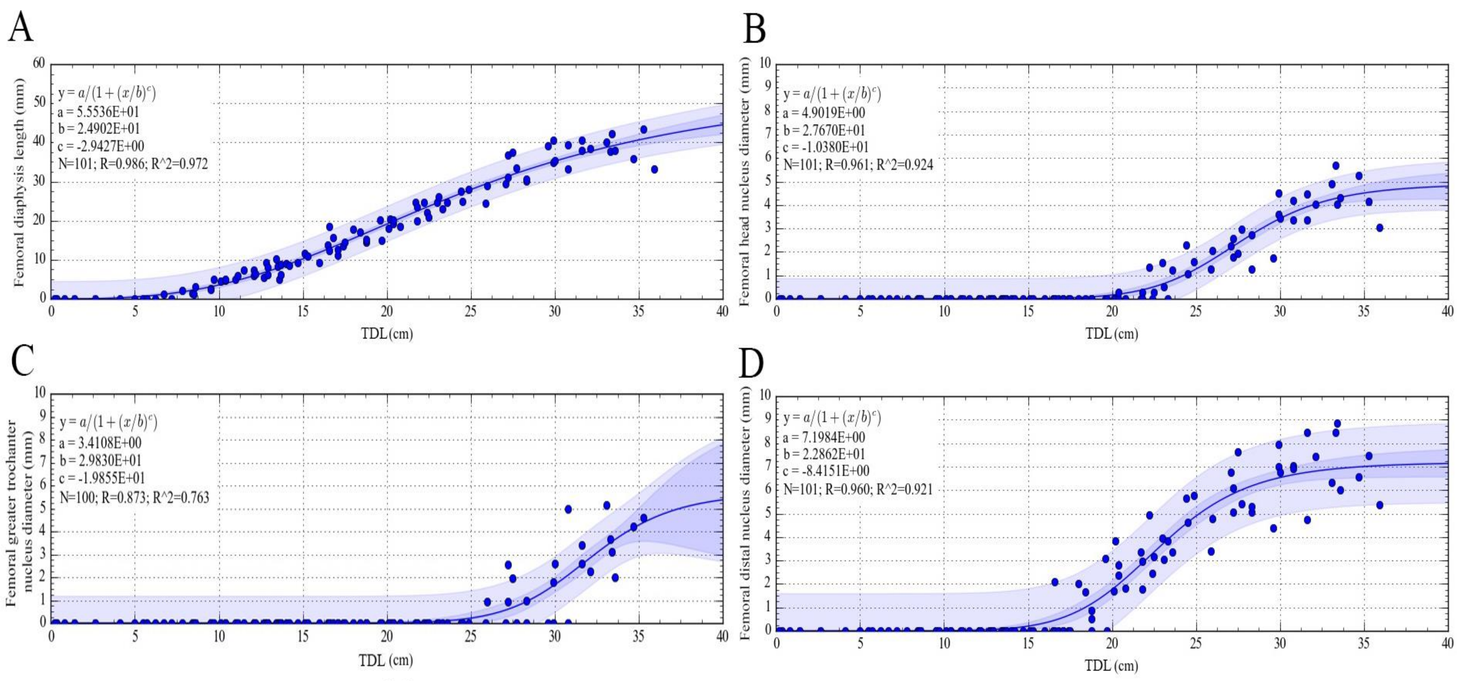

Figure 2. Relationship between total dorsal length (TDL) in embryos / fetuses of lowland paca (*Cuniculus paca*) and mineralized structures of the femur. **A.** Diaphysis length. **B.** Head nucleus diameter. **C.** Greater trochanter nucleus diameter. **D.** Distal nucleus diameter.

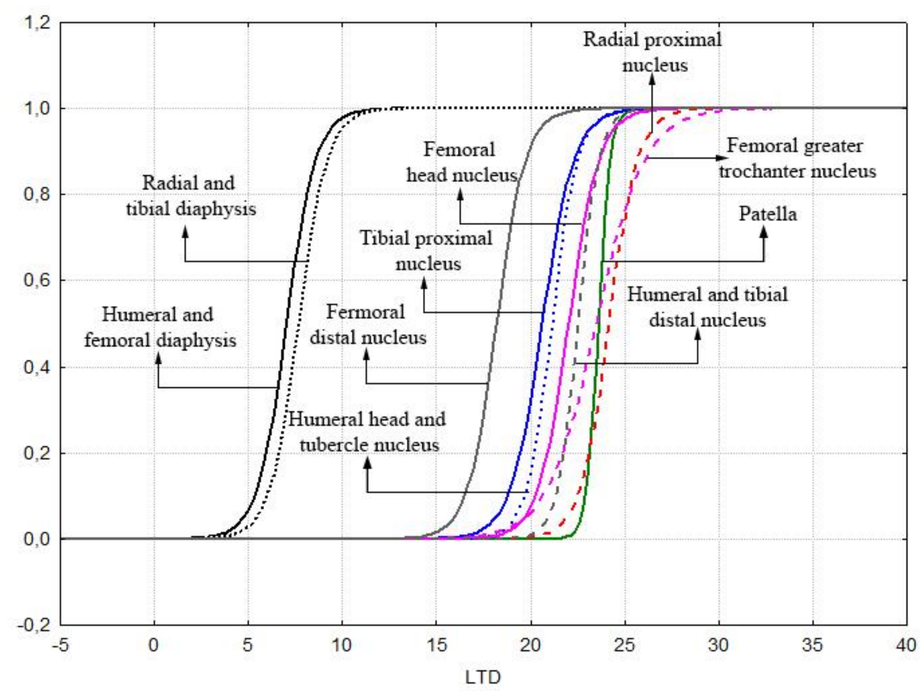

Figure 3. Probability curves for the occurrence of skeletal bone mineralization in 101 embryos/fetuses of lowland paca (*Cuniculus paca*) in relation to TDL.

Conclusions

Paca fetuses have a skeleton sufficiently developed to favor the newborn locomotion, and earlier compared to that in domestic carnivores.

References

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